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Research Publication Trends in Indian LIS Journals: A Scientometric Study

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Abstract:

The present paper explores the Scientometric analysis of the three reputed and highly circulated Indian Library and Information Science (LIS) journals during last five years i.e. from 2015 to 2019. Total 673 articles published in scope period are analysed by applying various parameters like year-wise distribution of articles, authorship pattern and degree of collaboration, relative growth rate and doubling time, Productivity trends with Lotka's Law and other parameters of Bibliographic Analysis. The study revealed that the Degree of Collaboration was quite high i.e. 463 (0.69) in terms of collaborators contribution. The study revealed that value of the relative growth rates (RGR) has decreased from 2015 (0.67) to 2019 (0.19) in the span of five years. The doubling time (DT) value has found increased from 1.03 to 3.64 in the respective years.

Keywords: Indian LIS Journals, LIS research trend, Subject growth, Bibliographic Analysis, Relative Growth Rate & Doubling Time, Lotka's Law; Scientific productivity; Kolmogorov – Smirnov (K.S) test.

1. Introduction

Journals have occupied an imperative position in the process of scholarly communication system. Nowadays scholarly communication has changed from written to print and print to electronics form but the significance of journals has remained unbothered and unaffected. In the field of Library and information science, LIS journals act as the primary resources for communication which allows LIS professionals to exchange new ideas, phenomenon and to put forth their views on future developments in librarianship. LIS journals play a vital role both in LIS Education and in the development of Librarianship. Quantitative analysis of journals helps to disclose different important hidden facts regarding the journals. These kinds of studies were named as Bibliometric, Scientometric studies, analytical studies, Content analysis, or other names. The nature of the present study is similar to the various objectives of metric studies.

2. About Source Journals

For the purpose of this study, three **Indian** LIS journals which are considered as source of journals **are taken in to consideration**. The source journals are as follows:

a) **Annals of Library and information studies (ALIS):**

Annals of library and information studies is one of the leading quarterly journal in the subject of Library and Information science published by INSDOC (NISCAIR) publishing original papers, survey reports, short communications, reviews, and letters pertaining to library and information science and computer applications in these fields. In 1954, INSDOC launched its first publication and Dr. S R Ranganathan was its first Editor. The journal's title was expanded to Annals of Library Science and Documentation in 1964 and again renamed in 2001 as Annals of Library and Information Studies. Now ALIS is available free online. (ALIS, 2020)

b) **SRELS Journal of Information Management:**

Sarada Ranganathan Endowment for Library Science (SRELS) Journal of Information Management this journal was founded in the year 1964 by Dr. S. R. Ranganathan, the Father of Indian Library Science. Initially, it was named as 'Library Science with Slant to Documentation. SRELS journal of Information Management completes its 50 years in the year 2013 and this is referred journal and ranked among top five Indian LIS Journals. (SRELSJIM, 2020)

c) **DESIDOC Journal of Library & Information Technology (DJLIT):**

This is a peer reviewed, open access bi-monthly journal started in 1981, which publishes original research and review papers in respect of Library Science, and IT oriented to library activities, services, and products. Major subject fields covered by journal includes Knowledge Management, Information Retrieval, Library Management, Library Services and more. (DJLIT, 2020)

3. Review of Literature

Those studies which are having similar objectives to present study have been quoted by the researcher which includes bibliometrics, Scientometrics, analytical studies and other studies which yields scholarly research publication trends with quantitative facts.

Gayatri Mahapatra (Mahapatra, 2020) examines in her study two types of relative growth rate and doubling Time i.e. for article publications and for the citations. It found that value of average relative growth rate of articles decreased gradually from 0.79 to 0.1 in 1983 and again increased to 0.13 in 1985. The value of doubling time publications increased from 0.88 in 1976 to 6.93 in 1983 and reduced to 5.33 in 1985. Narendra Kumar (Narendrakumar, 2010) in his study applied Kolmogorov-Smirnov Test to examine validity of Lotka's Law. Generally Lotka's Law describes the frequency of publications by authors in a given discipline or subject. Narendra Kumar attempted to study the applicability of the Lotka's Law to the publications of an organization instead of a subject or a discipline. A K-S test is applied for the fitness of Lotka's law which does not found fit to the two sets of CSIR data. K. P. Singh and Bebi (Singh & Bebi, 2014) in their comparative study on of ALIS and DJLIT for a period of four years (2010-2013) found that DJLIT has published maximum publications and received more citations as compared to ALIS. In their research paper, examined authorship pattern, gender wise distribution, major authors, and their affiliations.

Results of this study indicate single authors contributed 48.72% (114) articles. Velmurugan and Radhakrishnan (Velmurugan & Radhakrishnan, 2014) analyzed Publication research trends on Technical Review Journal. This study was undertaken to examine the year wise distribution of contributions, authorship pattern, and degree of collaboration, relative growth rate and doubling time. Parameshwar, Goutami & Patil (Parameshwar, Goutami, & Patil, 2016) examines publication trends of Library Herald Journal and found that 'Riahinia

Nosrat' has emerged as most prolific author in their studies with 18 articles. 'University of Delhi' is the most contributing organization and most contributing State of India with 58 contributions. Sahoo, Mohanty and Das (Sahoo, Mohanty, & Das, 2018) in their analytical study based on publication pattern found 0.72 ratio of degree of collaboration. Authorship pattern and collaborative trends in ALIS journal has been studied by Abu KS & Varma (Abu & Varma, 2019). Authors applied Lotka's law to examine the productivity of authors and observed percentage of authors has varied largely with the expected percentage of authors. Further, the obtained chi-square value (523.925) was more than the table value (11.07) at the 0.05 level of significance, which is explicit that this data is not applicable to Lotka's law.

4. Objectives of the study

- To find out the year wise distribution of articles among journals under study.
- To do Bibliographic analysis of journal articles, using parameters like gender; illustrations, keywords, Designations & Departments, prolific authors and more.
- To **identify** the Relative Growth Rate and Doubling Time of Literature under study.
- To know the authorship pattern and degree of collaboration among articles.
- To apply Kolmogorov- Smirnov (K-S) test to examine the validity of Lotka's law.

5. Scope and Limitations

The scope of the present study is concerned to the three reputed journals of Library & Information Science namely ALIS; (SRELS) Journal of Information Management and DJLIT. Total 673 published research articles are taken into consideration for the analysis purpose excluding other contents of the journals. The study is restricted to the research articles for the period of 2015 to 2019.

6. Data analysis & interpretation :

For the requisite data collection, archives under each journal have been browsed through respective websites during February 2020. A total of 673 articles under scope period were downloaded from three source journals and the details of the same were recorded under MS Excel sheet viz., title of the article, year of publication, number of authors, name of authors with institutional and other details, gender and more. Further subsequent analysis and interpretation of the data is done as per the objectives of research. It is shown as under.

a) Year wise distribution of Published Articles

Table 1 Year wise distribution of Published Articles

Publication Year	Journals			Year wise Total Articles
	ALIS	SRELS	DJLIT	
2015	37	60	53	150
2016	31	64	49	144
2017	28	47	58	133
2018	25	48	60	133
2019	18	46	49	113
Journal wise Total Articles	139	265	269	673

Table No. 01 indicates year wise distribution of published research articles under scope period. Out of 673 articles, contribution of SRELS & DJLIT journal found almost similar i.e. 265 & 269 respectively whereas contribution of ALIS Journal found comparatively very less

under study. An average 28 articles published per volume in ALIS whereas normally 53 articles found in other two journals.

b) The Relative Growth Rate (RGR) and Doubling Time (Dt)

The relative growth rate (RGR) was calculated using the following equation described by Jackson (1980)(Pistori, Camargo, & Henry-Silva, 2004):

$$RGR = \frac{\ln M_2 - \ln M_1}{T_2 - T_1}$$

or

$$1 - 2^{\bar{R}} = \frac{\text{Log}_e W_2 - \text{Log}_e W_1}{T_2 - T_1}$$

$1 - 2^{\bar{R}}$ = Mean relative growth rate over the specific period of interval

$\text{Log}_e W_1$ = log of initial number of articles

$\text{Log}_e W_2$ = Log of final number of articles after a specific period of interval

$T_2 - T_1$ = The unit difference between the initial time and the final time

Here the year can be taken as a unit of time. The RGR for articles is calculated. $1 - 2^{\bar{R}}$ (aa-1 year-1) can represent the mean relative growth rate per unit of articles per unit of year over a period (Tague, Beheshti, & Rees-Potter, 1981).

Krishnamurthy, Ramakrishnan and Devi (Krishnamoorthy, Ramakrishnan, & Devi, 2009) cited the definition of Doubling Time of Bradford (1934) in their paper. There are direct equivalence between the relative growth rate and doubling time. The numbers of articles or pages are doubles during a specific period. Then the difference between the logarithm of the initial and final period must be the logarithm of a number is 2. Natural logarithm of 2 is 0.693.

The doubling time was obtained using the formula described by D. S. Mitchell(Mitchell, 1974):

$$DT = \frac{\ln 2}{RGR}$$

Where DT = doubling time

RGR= Relative Growth Rate

$$\text{DoublingTime}(Dt) = \frac{\ln 2}{1 - 2^{\bar{R}}}$$

Therefore,

$$\text{DoublingTime}(Dt)\text{of articles}(a) = \frac{0.693}{1 - 2^{\bar{R}}(aa - 1 \text{ year} - 1)}$$

And

$$\text{DoublingTime}(Dt)\text{of pages}(p) = \frac{0.693}{1 - 2^{\bar{R}}(pp - 1 \text{ year} - 1)}$$

Relative Growth and Doubling Time of Literature under study is shown as under

Table 2 Relative Growth and Doubling Time of Literature

Year	Total of Articles All Journals	Cumul. No. of Articles	W ₁	W ₂	Relative Growth R(a)	Mean of R(a)	Doubling Time (Dt)	Mean of Dt
2015	150	150	0.00	5.01				
2016	144	294	5.01	5.68	0.67		1.03	
2017	133	427	5.68	6.05	0.37	0.52	1.87	1.45
2018	133	560	6.05	6.32	0.27		2.56	
2019	113	673	632	6.51	0.19	0.23	3.64	3.1
Total	673							
Average Mean Value					0.37		2.27	

Table No. 2 indicates the literature growth based on relative growth rate (RGR) and Doubling Time (DT). As per the table relative growth rates (RGR) found decreased from 2015 (0.67) to 2019 (0.19) in the span of five years. The doubling time (DT) value has found increased from 2015 (1.03) to 2019 (3.64) in the span of five years. An average mean value of Relative Growth Rate observed 0.37 where as it is 2.27 concerned to the Doubling Time.

Table 3 Gender wise Productivity

Gender	ALIS		SRELS		DJLIT		Grand Total	
Female	69	25.65%	141	28.54%	144	26.23%	354	26.99%
Male	200	74.35%	353	71.46%	405	73.77%	958	73.01%
Grand Total	269	100%	494	100%	549	100%	1312	100%

Table No. 3 indicate that total 1312 scholars contributed in the scope period out of which 958 (73.01%) are the males and remaining 354 (26.99%) contributors are females. Male researchers are dominating and female researchers are comparatively very low and need to contribute more.

c) Authorship pattern

Authorship is an important parameter largely used in the metric studies. Contemporary communication patterns, productivity, and collaboration among the researchers can be disclosed with these parameters. Authorship has been analyzed to determine the percentage of single and multiple authors.

Table 4 Authorship Pattern

Authorship	ALIS		SRELS		DJLIT		Overall	
Single	44	32%	92	35%	74	28%	210	31%
Two	70	50%	128	48%	133	49%	331	49%
Three	17	12%	35	13%	46	17%	98	15%
Four	6	4%	9	3%	9	3%	24	4%
Five	2	1%	1	0%	7	3%	10	1%
Grand Total	139	100%	265	100%	269	100%	673	100%

Table No. 4 shows that contribution of the single author is 31% in total whereas it is 49% for the two authorship. Maximum 05 authors pattern found under study and total 10 articles found written by the five authorship. Almost similar authorship pattern found among the three selected journals.

d) The degree of collaboration

The degree of collaboration (Subramanyam, 1983) in a discipline defined as the ratio of the number of collaborative research papers to the total number of research papers published in the

discipline during a certain period. The degree of collaboration in respect of a discipline or an organization is the ratio of multi-authored papers published during a year and the total number of papers published during the year.

$$C = N(m) / (N(m) + N(s))$$

Where, N (m) is the number of multi-authored papers and N (s) is the number of single-authored papers. This index or degree is time dependent. In other words, Collaboration coefficient is the ratio of the number of collaborative papers to the total number of papers published during a fixed period. (Kalyane& Sen, 2003).(Kulkarni, 2011). Degree of collaboration under present study is derived through following table.

Table 5 The degree of collaboration

Authorship Pattern	Articles			
	ALIS	SRELS	DJLIT	Grand Total
Single Authored Papers(Ns)	44	92	74	210
Multi-Authored Papers(Nm)	95	173	195	463
Nm+N _s	139	265	269	673
Degree of Collaboration (DC) $DC = \frac{Nm}{Ns + Nm}$	0.68	0.65	0.72	0.69

Table No. 5 indicates degree of collaboration under selected journals individually as well as collectively. Putting the values of Single author papers and Multi authored papers into given equation of Subramanyam, collective degree of collaboration under study found 0.69 where as it 0.68 for ALIS and 0.65 and 0.72 for SRELS and DJLIT respectively.

e) Productivity trends and application of Lotka's Law

William Gray Potter(Potter, 1981) explained the Lotka's law, the original statement of what has come to be known as Lotka's law was made in 1926 journal article, "The Frequency Distribution of Scientific Productivity: the number (of authors) making n contributions is about $1/n^2$ of those making one; and the proportion of all contributors, that make a single contribution, is about 60 percent."

Table 6 Productivity trends

No. of Articles	No. of Authors Observed	Percentage of Authors	Expected No. of Authors $a=C/n^2$	Total No. of Contributors
1	700	77.69%	700.00	700
2	111	12.32%	175.00	222
3	48	5.33%	77.78	144
4	17	1.89%	43.75	68
5	8	0.89%	28.00	40
6	5	0.55%	19.44	30
7	4	0.44%	14.29	28
8	5	0.55%	10.94	40
9	1	0.11%	8.64	9
12	1	0.11%	4.86	12
19	1	0.11%	1.94	19

	901	100.00%	1084.64	1312
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Table No. 6 shows that productivity trends in Indian LIS publications from ALIS, SRELS and DJLIT journals. There 700 (77.69%) authors **who have** written single article and maximum 19 articles are authored by one author. Hence, Lotka's inverse square law is not fit. For testing of Lotka's Law following K-S Test is follow.

f) Determination of exponent value (α)

Since the productivity distribution has not fitted Lotka's inverse square law applied to it; hence, a different procedure was adopted. The value of productivity constant was determined by using following formula for the data when full authorship was given only to first authors:

$$n^\alpha = \frac{\text{Proportion of Authors contributing } n \text{ papers}}{\text{Proportion of authors contributing only 1 paper}}$$

$$a_n = \frac{c}{n^\alpha} \text{ or } n^\alpha = \frac{c}{a_n} \text{ or } \log n^\alpha = \frac{\log c}{\log a_n} \text{ or } \alpha \log n = \frac{\log c}{\log a_n}$$

Determination of exponent value (α)

$$\alpha = \frac{\log C - \log a_n}{\log n}$$

$$\alpha = \frac{\log 700 - \log 111}{\log 2}$$

$$\alpha = \frac{2.5450 - 2.0453}{0.3010}$$

$$\alpha = \frac{0.4997}{0.3010}$$

$$\alpha = 1.6601 \text{ or } \alpha = 1.66$$

Table 7 Determination of Exponent value (α)

No. of Articles	No. of Authors Observed	Percentage of Authors	Expected no. of authors $\alpha=C/n^2$	Total No. of Contributors	Observed no. of Authors $\alpha=1.66$
1	700	77.69%	700.00	700	700.00
2	111	12.32%	175.00	222	221.51
3	48	5.33%	77.78	144	113.00
4	17	1.89%	43.75	68	70.09
5	8	0.89%	28.00	40	48.40
6	5	0.55%	19.44	30	35.76
7	4	0.44%	14.29	28	27.68
8	5	0.55%	10.94	40	22.18
9	1	0.11%	8.64	9	18.24
12	1	0.11%	4.86	12	11.32
19	1	0.11%	1.94	19	5.28
	901	100.00%	1084.64	1312	1273.45

Table No. 7 explained the Determination of Exponent value (α) that is 1.66 of the data set.

g) Determination of estimated proportion

Having found the value of α , Lotka's fraction $1/n^\alpha$ was summed up for all values of $N = \alpha$ applying the **Euler-Maclauring** formula of summation. Then the sum was used as a divisor for $1/n^\alpha$ to determine the proportion of the total number of authors who should be expected to produce n papers. The following formula used to find the proportions,

Determination of estimated proportion of authors

First, the value of S calculated by using formula,
Where $n = 1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 19$ for overall set of data;

$$S = \sum 1/n^\alpha$$

$$S = \sum 1/n^{1.66}$$

$$S = 1.8192$$

Table 8 Determination of estimated proportion of authors

No. of Articles	No. of Authors Observed	Percentage of Authors	Expected no. of authors $\alpha = C/n^2$	Total No. of Contributors	Observed no. of Authors $\alpha = 1.66$	Determination of estimated proportion of authors $S = \sum 1/n^{1.66}$
1	700	77.69%	700.00	700	700.00	1.0000
2	111	12.32%	175.00	222	221.51	0.3164
3	48	5.33%	77.78	144	113.00	0.1614
4	17	1.89%	43.75	68	70.09	0.1001
5	8	0.89%	28.00	40	48.40	0.0691
6	5	0.55%	19.44	30	35.76	0.0511
7	4	0.44%	14.29	28	27.68	0.0395
8	5	0.55%	10.94	40	22.18	0.0317
9	1	0.11%	8.64	9	18.24	0.0261
12	1	0.11%	4.86	12	11.32	0.0162
19	1	0.11%	1.94	19	5.28	0.0075
	901	100.00%	1084.64	1312	1273.45	1.8192

Table No. 8 is displayed the proportion value of authorship. As per Euler-Maclauring's formula, Value of Proportion of authors is 1.8192 calculated

The expected number of authors

The expected number of authors (An) was calculated for a present set of overall data.

$$An = \frac{1}{S} \times T$$

Where, α is the productivity constant or characteristic exponent

T is total number of authors in the sample and

An is the total number of expected authors producing n papers.

Where $n = 1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 19$ for overall set of data

$$An = \frac{1}{\frac{1^{1.66}}{1.8192}} \times 901$$

$$An=495.2726$$

As per data and formula, Value of Expected Author (An) found i.e. 495.2726.

h) Kolmogorov-Smirnov Test

The test is accomplished by finding the theoretical cumulative frequency distribution, which would be expected under the null hypothesis [F (x)], and comparing it with the observed cumulative frequency distribution [Sn(x)]. The point at which this two distribution, theoretical and observed show the maximum deviation is determined. Let D = Maximum |F(x)–Sn (x)|. The value of D is calculated and compared with the critical value. The null hypothesis is rejected if the calculated value of D is greater than a critical value; otherwise not.

After the values of a, S and proportion of authors (An) were determined; the observed and estimated values of the proportions were statistically tested by applying K-S test to present set of data. The data for Kolmogorov-Smirnov test with the value of $\alpha = 1.66$ for overall data are specified in the Table 9.

i) Productivity Trend: Proportion of author

Table 9 depicts Productivity Trend with proportion of authors for overall articles ALIS, SRELS and DJLIT where only first authors were considered with exponent value of $\alpha = 1.66$

Table 9 Productivity Trend: Proportion of author

No. of Articles	No. of Authors Observed	Observed	Sn(x)	No. of Authors Expected(An)	Expected	Fo(x)	Fo(x) - Sn(x)
1	700	0.777	0.777	495.273	0.5497	0.550	0.227
2	111	0.123	0.900	156.724	0.1739	0.724	0.176
3	48	0.053	0.953	79.951	0.0887	0.812	0.141
4	17	0.019	0.972	49.593	0.0550	0.867	0.105
5	8	0.009	0.981	34.242	0.0380	0.905	0.076
6	5	0.006	0.987	25.300	0.0281	0.933	0.053
7	4	0.004	0.991	19.588	0.0217	0.955	0.036
8	5	0.006	0.997	15.693	0.0174	0.973	0.024
9	1	0.001	0.998	12.906	0.0143	0.987	0.011
12	1	0.001	0.999	8.006	0.0089	0.996	0.003
19	1	0.001	1.000	3.733	0.0041	1.000	0.000

At 0.01 level of significance, K. S. Static = $1.63/\sqrt{901} = 0.0543$. Therefore, data fits in to generalized form of Lotka's law with exponent value of $\alpha = 1.66$.

j) Illustrations wise articles (Tables)

Table 10 Illustrations wise articles (Tables)

Year	ALIS	DJLIT	SRELS	Total
------	------	-------	-------	-------

2015	129	284	426	839
2016	104	256	434	794
2017	155	290	225	670
2018	88	323	276	687
2019	62	256	168	486
Total	538	1409	1529	3476

Table no. 10 shows that 538 tables appeared in ALIS whereas 1409 & 1529 tables counted in the DJLIT & SRELS journals respectively. Collectively 3476 tables found in the 673 published articles it means an average 5.16 tables per articles published in the given journals.

k) Illustrations wise articles (Figures)

Table 11 Illustrations wise articles (Figures)

No. of Figures	ALIS	DJLIT	SRELS	Total
2015	35	67	138	240
2016	40	124	131	295
2017	26	141	134	301
2018	25	79	107	211
2019	51	113	138	302
Total	177	524	648	1349

Table No. 11 shows that 177 figures appeared in ALIS whereas 524 & 648 figures counted in the DJLIT & SRELS journals respectively. Collectively 1349 figures found in the 673 published articles it means an average 2.004 figures counted per articles in the given journals.

l) Top Ten Author's Designation

Table 12 Top Ten Author's Designation

Designation	ALIS	SRELS	DJLIT	Grand Total	Rank
Librarian	33	49	90	172	1
Assistant Librarian	18	37	55	110	2
Assistant Professor	24	28	42	94	3
Research Scholar	16	27	49	92	4
Professor	18	25	44	87	5
Associate Professor	15	22	46	83	6
Deputy Librarian	11	14	36	61	7
Lecturer	9	1	12	22	8
Head	7	1	9	17	9
Chief Librarian	1	2	12	15	10
Designation not mentioned	36	239	6	281	

Total No. 12 shows that various designations found under study out of which top ten ranked designations along with published articles shown in the above table. The rank first obtained by Librarian with total 172 articles it has followed by Assistant Librarian designation

with 110 articles. Articles without designation also found in large numbers and those are 281 articles.

m) Department wise Contribution

Table 13 Department wise Contribution

Name of Department	ALIS	SRELS	DJLIT	Contributors	Rank
Library	71	152	189	412	1
Department of Library and Information Science	75	155	158	388	2
CSIR	20	16	28	64	3
DRDO			23	23	4
Centre for Learning Resources	2		18	20	5
Department of Studies in Library and Information Science	1	11	3	15	6
Department of Information Science and Library Management	7		4	11	7
Department of Computer Science and Engineering		10		10	8
University Library	6		2	8	9
Department of Library and Information Science			7	7	10
Department Not Mentioned	19	90	2	111	

Table No. 13 indicates that top ten ranked departments, which were concerned to the publication of articles. As per the Table Department of Library occupied first rank with 412 articles it is followed by Department of Library & Information Science with second rank and 388 articles. There is a total of 111 including those articles also counted in which department are maintained by the authors.

n) Institute wise Contribution

Table 14 Institute wise Contribution

Name of Institute	ALIS	SRELS	DJLIT	Contributors	Rank
CSIR –National Institute of Science Technology and Development Studies, New Delhi	15	4	21	40	1
University of Delhi, Delhi	5	10	25	40	1
Aligarh Muslim University, Aligarh	3	11	11	25	2
University of Mysore, Mysuru	5	15	5	25	2
Banaras Hindu University, Varanasi	4	7	11	22	3
Covenant University Ota	6		15	21	4
University of Calcutta, Kolkata	8	7	6	21	4
Panjab University, Chandigarh		9	10	19	5
Pondicherry University, Puducherry	5	5	9	19	5
Jawaharlal Nehru University, Delhi	3		15	18	6
Shri Venkateshwar University, Tirupati	3	9	6	18	6

Jadavpur University, Jadavpur, Kolkata	2	14	1	17	7
Mizoram University, Aizawl	3	6	7	16	8
Vidyasagar University, Midnapore	1	12	3	16	8
PES University, Bangalore	1	13	1	15	9
Vardhman Mahaveer Open University, Kota	6	4	4	14	10

Table No.14 denotes the top ten rankings of institutions of authors under study. As per this table CSIR –National Institute of Science Technology and Development Studies, New Delhi and University of Delhi these two institutions combine occupied first rank with 40 separate research papers. Two other institutions together obtained second rank with 25 separate research papers. Total 16 institutions found place in the above top ten rankings.

o) Subject Keywords

Table 15 No. of Keywords

No. of Keywords	ALIS	SRELS	DJLIT	Total No. of Articles
0	2	1		3
2	3	6	2	11
3	24	42	23	89
4	36	74	61	171
5	38	67	79	184
6	19	41	61	121
7	10	17	28	55
8		9	12	21
9	4	3	2	9
10		1	1	2
11	3	2		5
12		2		2
Grand Total	139	265	269	673

Table No. 15 shows the frequencies of keywords used in the articles under study. As per the Table No. 15 total three articles in which no keyword found used whereas, three keywords found used in 89 articles. Highest frequency of five keywords found used in 184 articles followed by frequency of 04 keywords found in 171 articles. Twelve keywords are also found used in two different articles.

*Table 16*Top five Keywords

Keywords	ALIS	DJLIT	SRELS	Grand Total
Scientometrics	7	10	12	29
India	7	14	7	28
Bibliometrics	8	11	6	25
Citation Analysis	4	8	5	17
E-Resources	3	5	7	15

Table No.16 discloses top five keywords appeared in the articles under study. As per this table, the keywords ‘Scientometrics’ occurred with 29 highest frequencies it’s followed by

the word 'India' with 28 frequency. Other keywords listed in the table are Bibliometrics, Citation Analysis and E-Resources. Total 3352 keywords counted under study.

p) Prolific Author

The Table 17 shows that Prolific Author in LIS publications. B. M. Gupta (Retired Scientist 'G', CSIR National Institute of Science Technology and Development Studies, New Delhi) maximum contributed in research publication in collected sample data in all three journals. He contributed 10(52%) articles in First Author in SRELS (03) and DJLIT (07), whereas 7 contributions from second position in ALIS(03), SRELS(02) and DJLIT(02), and only two articles written on third position in SRELS(01) and DJLIT (01).

Table 17 Prolific Author

Name of Author	Position			Total Contributions
	First	Second	Third	
B.M. Gupta	10 (SRELS-3) (DJLIT-7)	7 (ALIS-3) (SRELS-2) (DJLIT-2)	2 (SRELS-1) (DJLIT-1)	19

7. Findings & Conclusion

Research publication trends of three reputed Indian LIS Journals is retrieved through present study. The major findings are as follows:

- Total 673 articles are retrieved from three journals under scope period in which in an average 28 articles published per volume in ALIS whereas on an average 53 articles found in other two journals.
- An average mean value of Relative Growth Rate observed 0.37 where as it is 2.27 concerned to
- Total 1312 scholars contributed in the scope period out of which 73.01% are the males and 26.99% contributors were females.
- Collectively 49% articles written under two authorship. Collective degree of collaboration under study found 0.69 where as it 0.68 for ALIS and 0.65 and 0.72 for SRELS and DJLIT respectively.
- Data under study found fits to Lotka's law with exponent value of $\alpha = 1.66$.
- An averagely 5.16 tables per articles published in the given journals. Whereas 2.004 figures counted per articles.
- The designation 'Librarian' got first rank in the designation wise analysis where as in department wise analysis 'Library' Department secured first rank.
- B. M. Gupta found prolific author. He contributed 19 research articles.

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